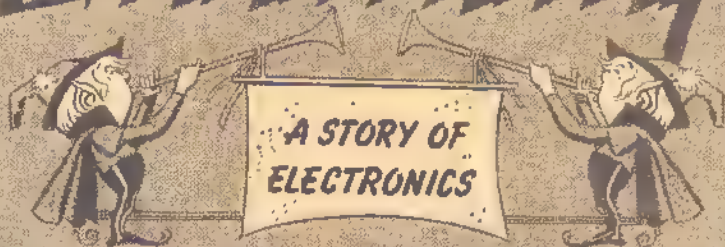


NUMBER
SEVEN

ADVENTURES IN *Electricity*

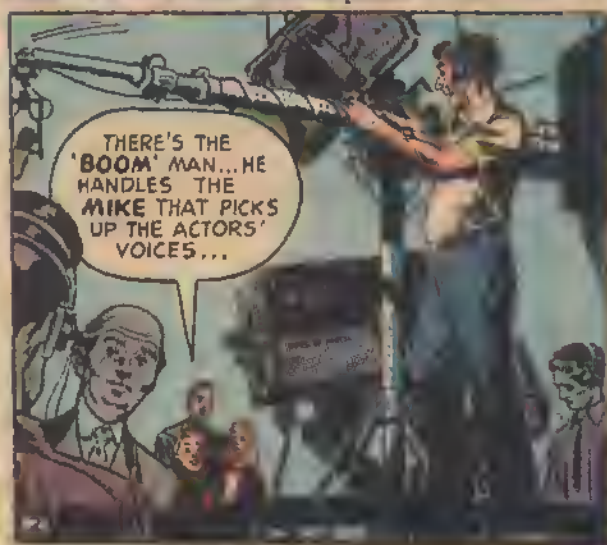
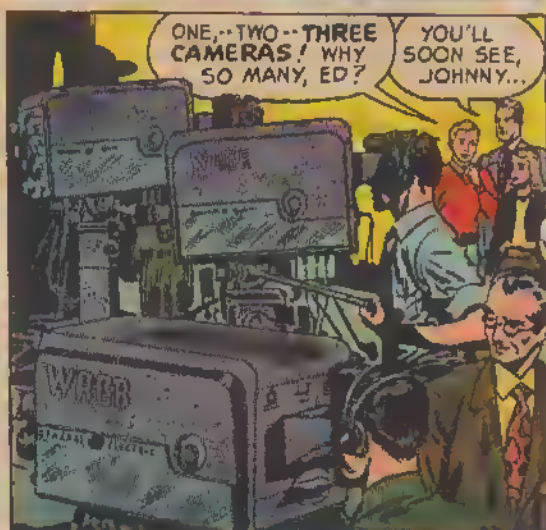
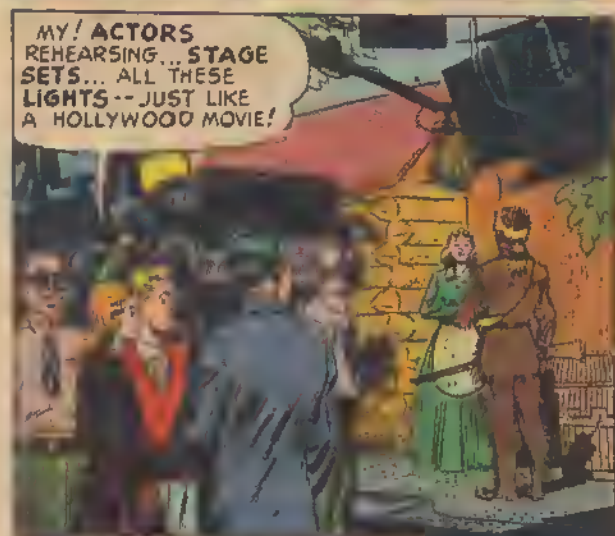
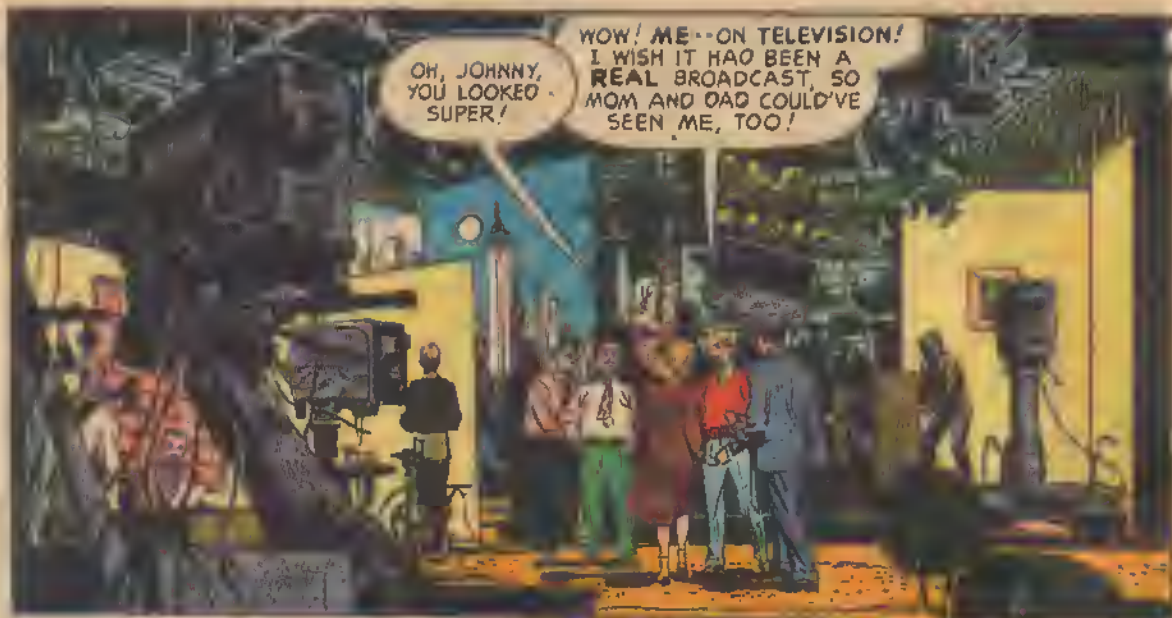


ADVENTURE
SERIES

Prepared for
GENERAL ELECTRIC
By GENERAL COMICS, Inc.



WEB COMIC
UNIVERSE.COM





YOU SEE, THE WHOLE SHOW--ACTORS, SETS, LIGHTS, CAMERAS, SOUND--EVERYTHING IS UNDER THE DIRECTION OF THE PRODUCER UP THERE IN THE CONTROL ROOM. LET'S GO UP...

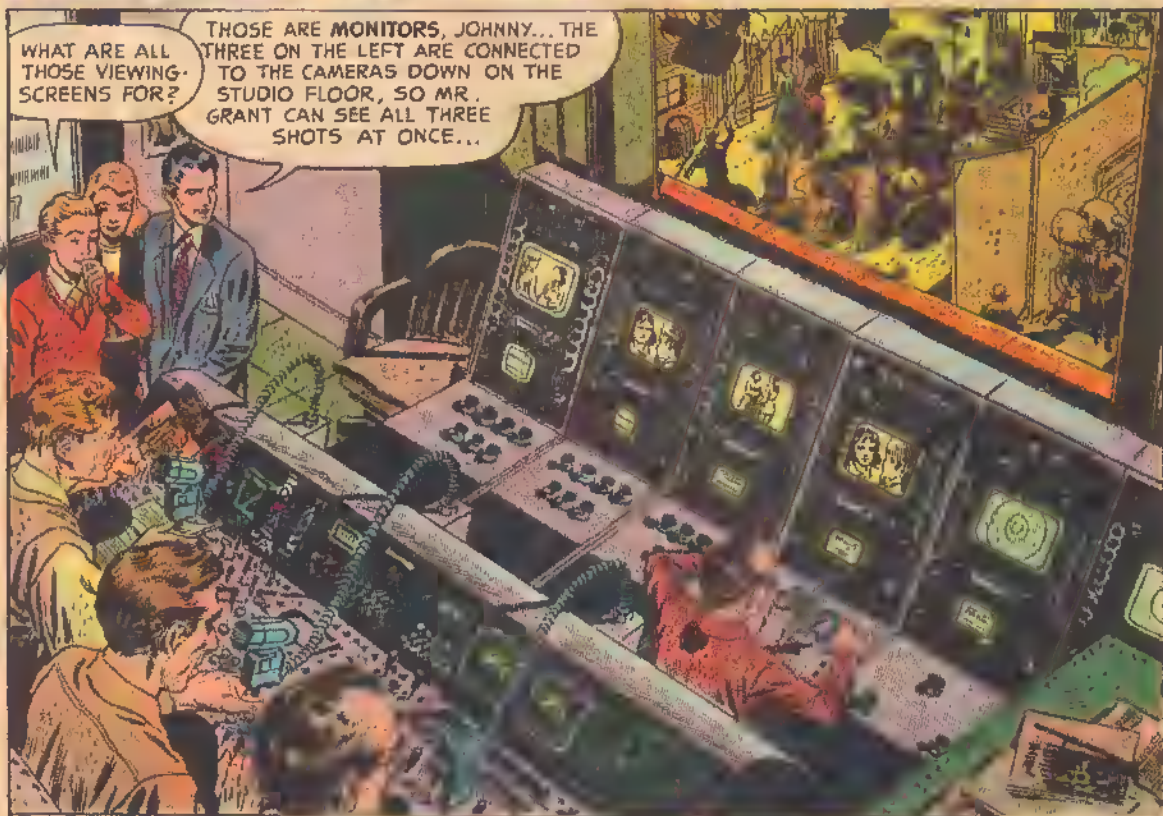


SOON, INSIDE THE CONTROL ROOM...

BUT, EO, THE SIGN SAID "NO VISITORS..."

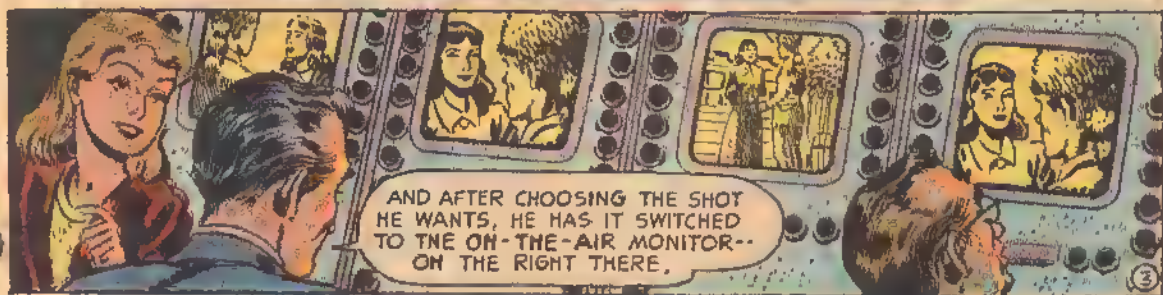
YOU CAN THANK MR. GRANT, THE PRODUCER HERE, FOR BREAKING THE RULES FOR YOU TWO!

HELLO, JANE--JOHNNY--YOU'RE JUST IN TIME... WE'RE ABOUT TO GO ON THE AIR!

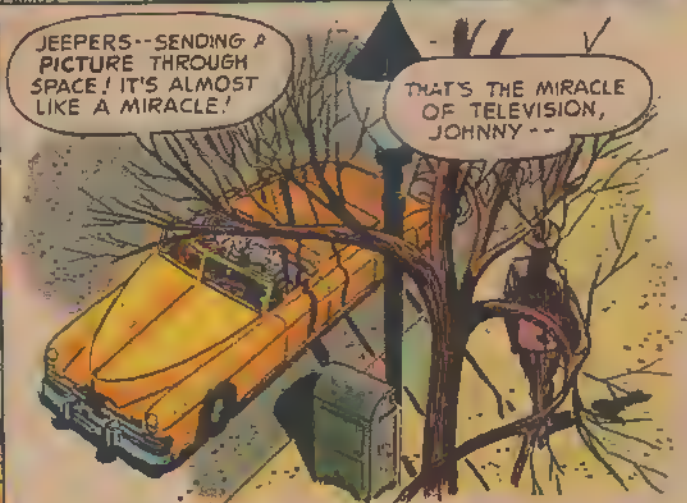
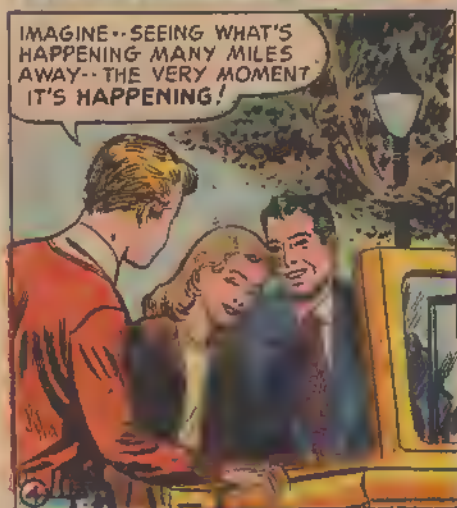
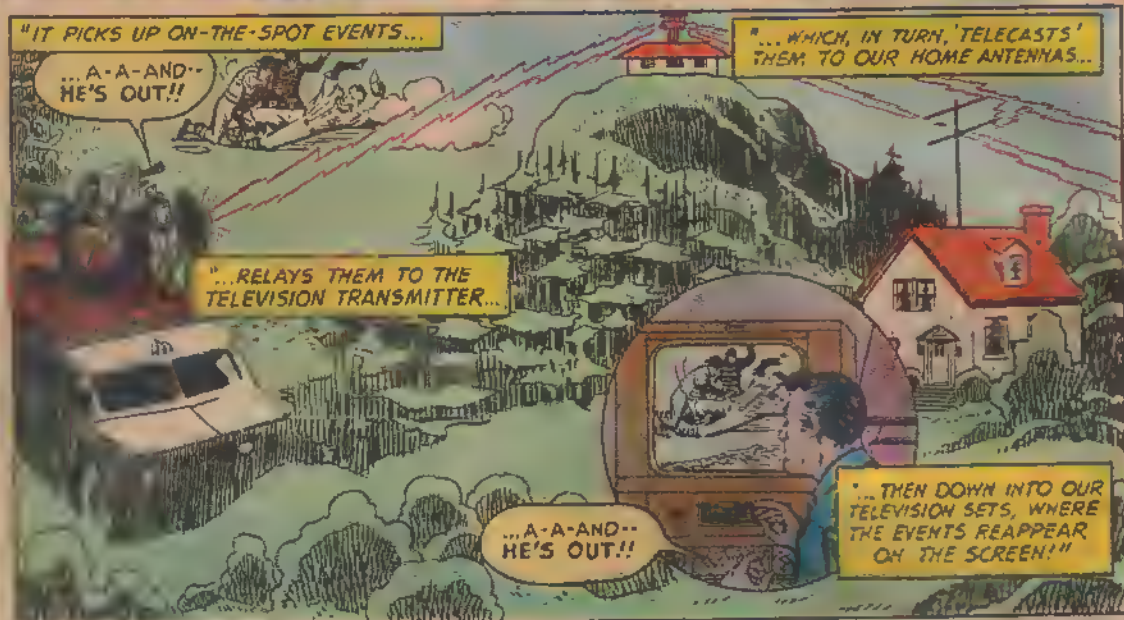
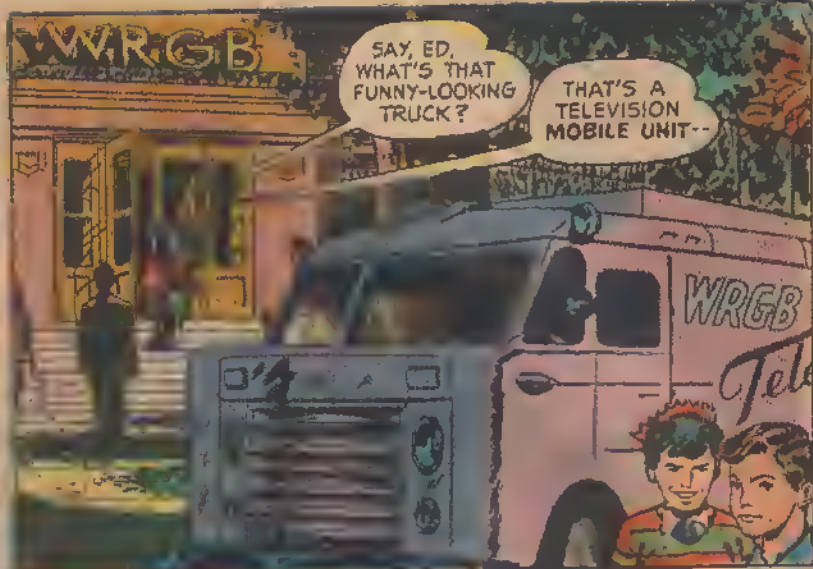
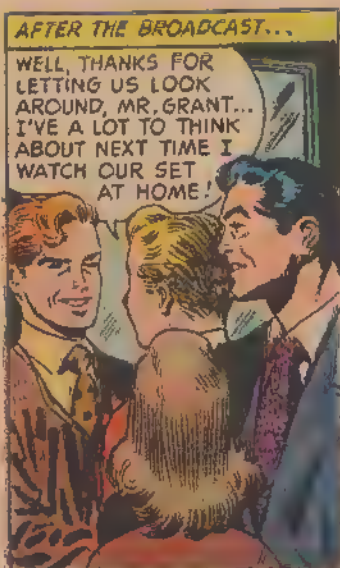


WHAT ARE ALL THOSE VIEWING-SCREENS FOR?

THOSE ARE MONITORS, JOHNNY... THE THREE ON THE LEFT ARE CONNECTED TO THE CAMERAS DOWN ON THE STUDIO FLOOR, SO MR. GRANT CAN SEE ALL THREE SHOTS AT ONCE...



AND AFTER CHOOSING THE SHOT HE WANTS, HE HAS IT SWITCHED TO THE ON-THE-AIR MONITOR--ON THE RIGHT THERE.



... A PICTURE PICKED UP BY AN ELECTRONIC TUBE... BROADCAST LIKE ANY RADIO SIGNAL... AND MADE VISIBLE IN OUR HOME SETS BY ANOTHER ELECTRONIC TUBE!

'ELECTRONIC TUBE'? DOES THAT HAVE ANYTHING TO DO WITH ELECTRONS?

YES-ELECTRONICS IS A WONDERFUL BRANCH OF ELECTRICAL SCIENCE-- THE USE AND CONTROL OF FREE ELECTRONS... ELECTRIC CURRENT IN SPACE!

GOLLY, THAT MIGHT MAKE SENSE TO YOU, JOHNNY-- BUT I'VE NEVER EVEN SEEN AN ELECTRON...

NOBODY HAS, JANE-- THEY'RE INVISIBLE... WHY, THEY'RE SO TINY THAT-- ER-- AH-- AREN'T THEY, EO?

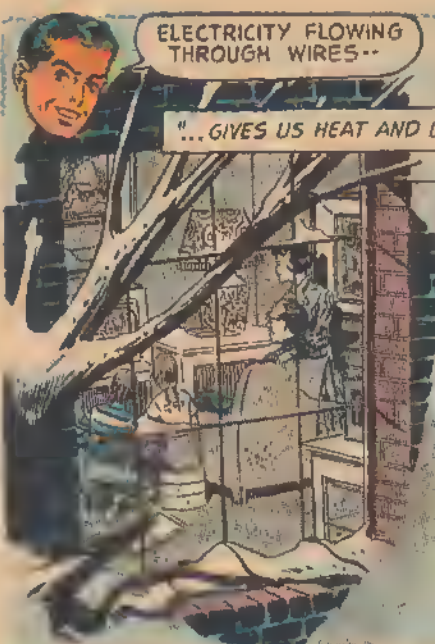
TINY IS RIGHT! IN FACT-- 25 TRILLION ELECTRONS, LINEO UP, WOULD EQUAL ONLY ONE INCH!

WE MAY BE TINY, BUT WE CAN DO MIGHTY BIG THINGS!

AND WHAT HAVE THEY TO DO WITH ELECTRIC CURRENT?

WELL, JANE, TO PUT IT SIMPLY--

"AN ELECTRIC CURRENT IS A STREAM OF MILLIONS OF THESE ELECTRONS PUSHED THROUGH A WIRE-- IN A CONTINUOUS PATH, OR CIRCUIT..."




ELECTRICITY FLOWING
THROUGH WIRES--

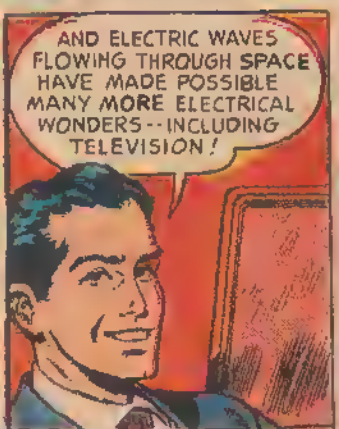
"...POWERS OUR MACHINERY..."

"...OPERATES THE ELECTRICAL
'SERVANTS' IN OUR HOMES..."

"...GIVES US HEAT AND LIGHT..."



"...AND MAKES LIFE EASIER, MORE
COMFORTABLE FOR ALL OF US."



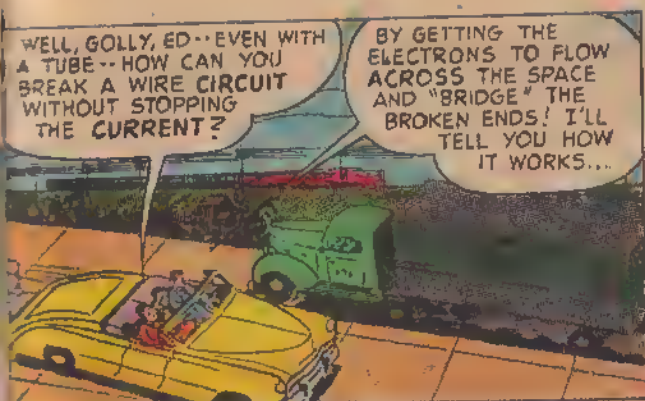
AND ELECTRIC WAVES
FLOWING THROUGH SPACE
HAVE MADE POSSIBLE
MANY MORE ELECTRICAL
WONDERS--INCLUDING
TELEVISION!

BUT, ED, HOW DO
YOU GET THESE WAVES
THROUGH SPACE?

THEY'RE SENT FROM THE TRANS-
MITTER WITH ELECTRONIC TUBES,
INSIDE WHICH THERE ARE ELECTRONS...
AND WE CAN OPEN THE CIRCUIT--AND
FREE THESE ELECTRONS FOR AN
INSTANT--WITHOUT STOPPING
THE CURRENT!

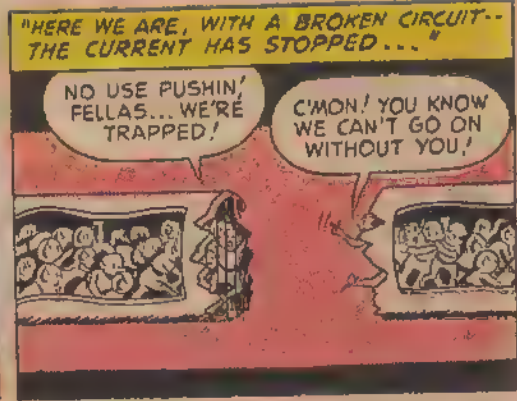
THERE'S THE KNOLLS--THE
GENERAL ELECTRIC RESEARCH
LABORATORY, WHERE SOME
OF THE WORLD'S GREATEST
SCIENTISTS ARE AT WORK...

IN FACT, IT WAS G.E.'S
DR. IRVING LANGMUIR WHO
HELPED DEVELOP THE HIGH-
VACUUM TUBE THAT MADE
MODERN ELECTRONICS POSSIBLE!



WELL, GOLLY, ED--EVEN WITH A TUBE--HOW CAN YOU BREAK A WIRE CIRCUIT WITHOUT STOPPING THE CURRENT?

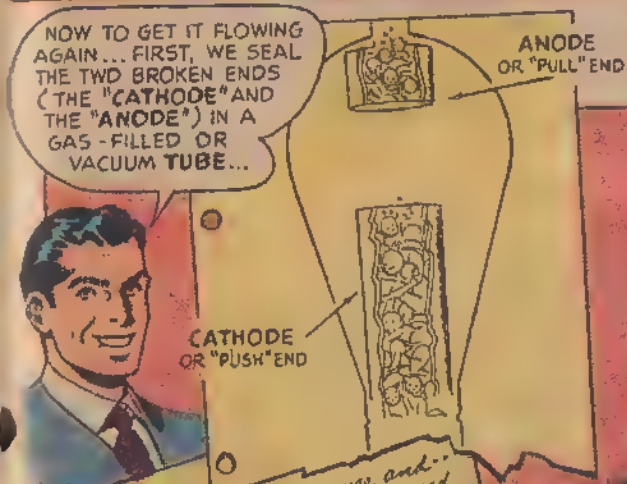
BY GETTING THE ELECTRONS TO FLOW ACROSS THE SPACE AND "BRIDGE" THE BROKEN ENDS! I'LL TELL YOU HOW IT WORKS...



"HERE WE ARE, WITH A BROKEN CIRCUIT--THE CURRENT HAS STOPPED..."

NO USE PUSHIN', FELLAS... WE'RE TRAPPED!

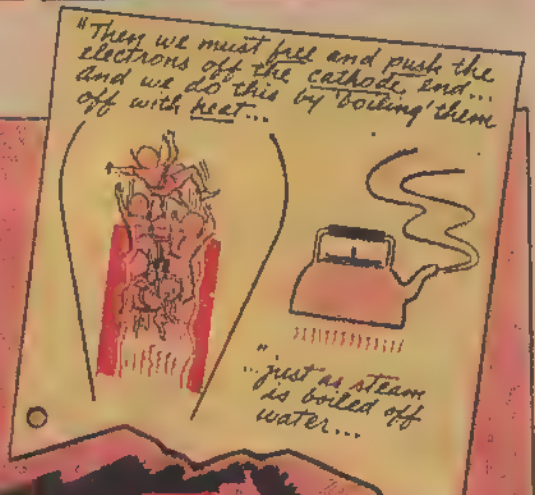
C'MON! YOU KNOW WE CAN'T GO ON WITHOUT YOU!



NOW TO GET IT FLOWING AGAIN... FIRST, WE SEAL THE TWO BROKEN ENDS (THE "CATHODE" AND THE "ANODE") IN A GAS-FILLED OR VACUUM TUBE...

ANODE OR "PULL" END

CATHODE OR "PUSH" END

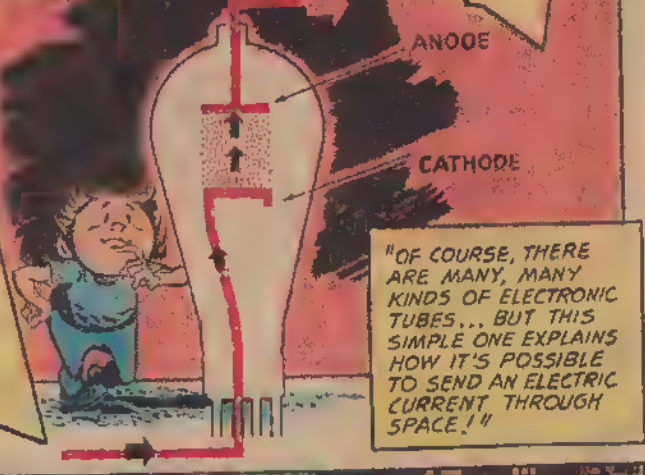


"Then we must heat and push the electrons off the cathode end... and we do this by boiling them off with heat..."

"...just as steam is boiled off water..."



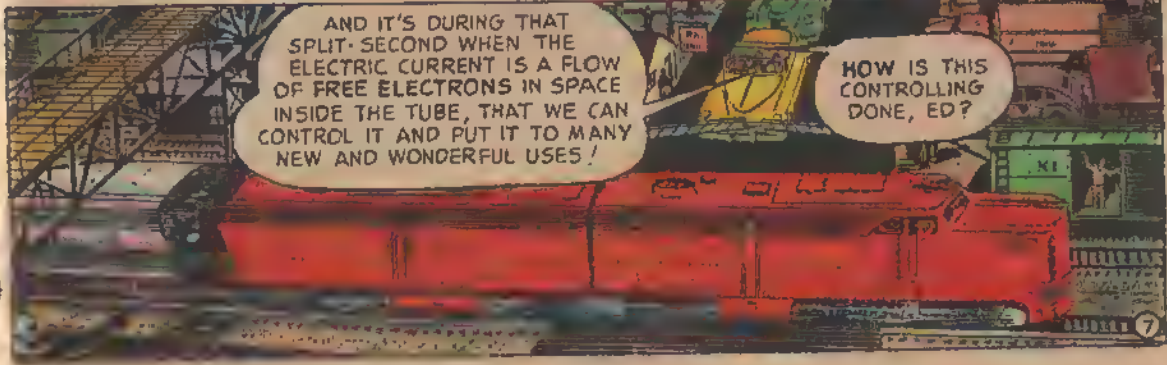
"Now the anode takes over and... like a magnet... pulls the freed electrons toward it."



ANODE

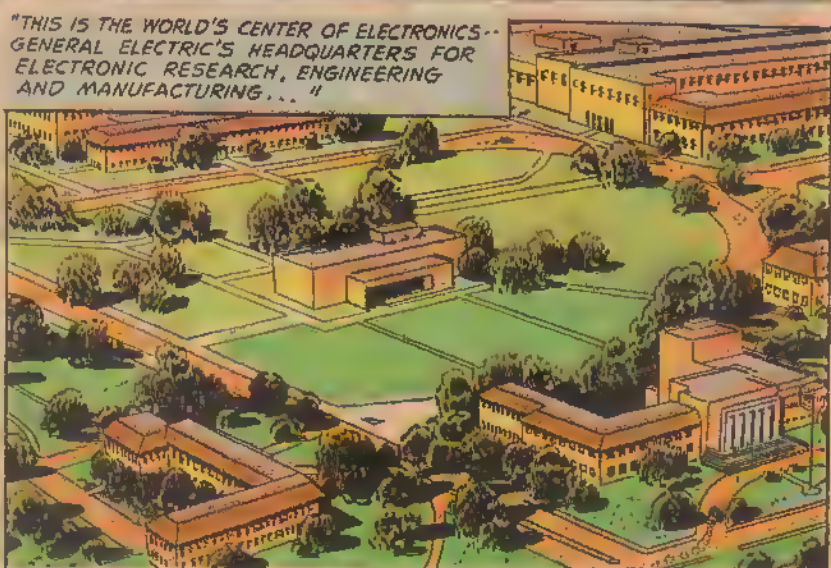
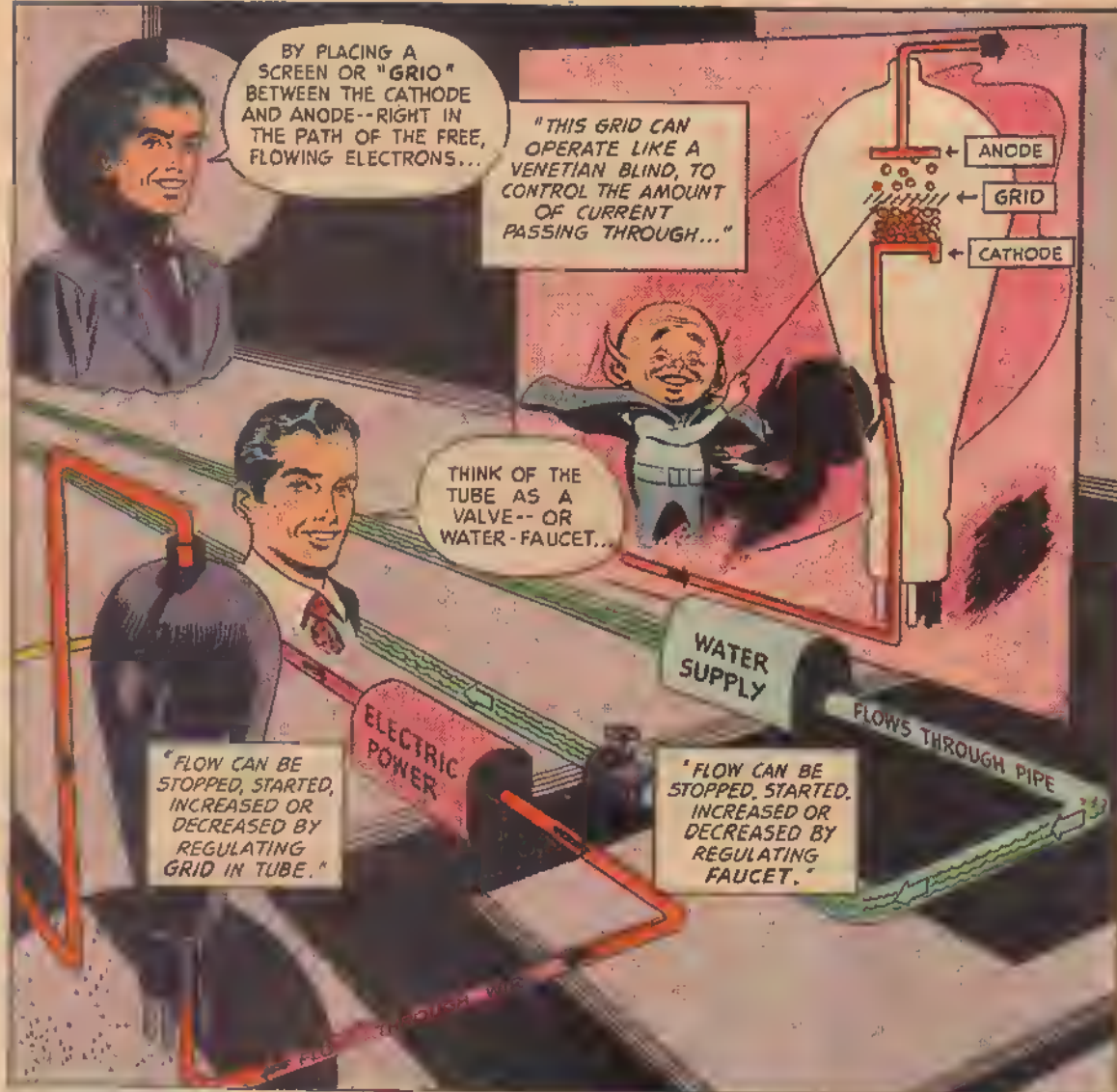
CATHODE

"OF COURSE, THERE ARE MANY, MANY KINDS OF ELECTRONIC TUBES... BUT THIS SIMPLE ONE EXPLAINS HOW IT'S POSSIBLE TO SEND AN ELECTRIC CURRENT THROUGH SPACE!"



AND IT'S DURING THAT SPLIT-SECOND WHEN THE ELECTRIC CURRENT IS A FLOW OF FREE ELECTRONS IN SPACE INSIDE THE TUBE, THAT WE CAN CONTROL IT AND PUT IT TO MANY NEW AND WONDERFUL USES!

HOW IS THIS CONTROLLING DONE, ED?



PHEWW! WHAT
ASSEMBLY LINES!

THOUSANDS OF TELEVISION SETS
COME OFF THESE LINES EVERY DAY,
JOHNNY! AS THE SETS MOVE
ALONG THE CONVEYOR-BELT,
EACH OPERATOR ADDS
ANOTHER PART...

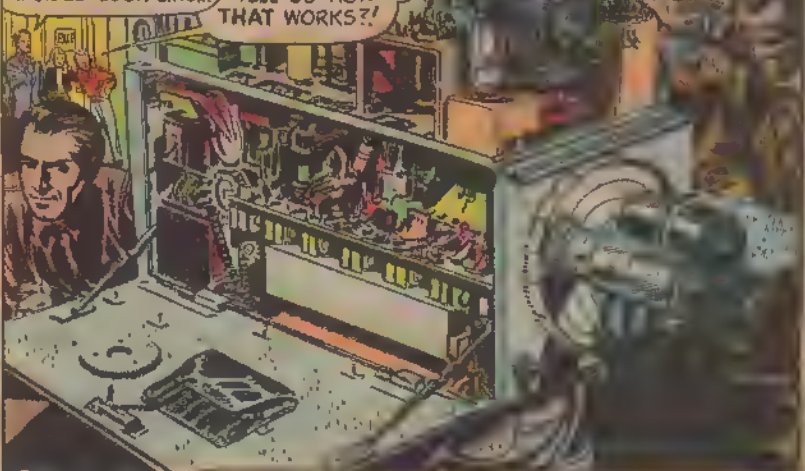


"AND ALL THE SETS ARE CAREFULLY
INSPECTED BEFORE SHIPMENT..."



AND THERE'S WHAT A
TELEVISION CAMERA'S
"INSIDES" LOOK LIKE...

BOY! AND YOU'RE
GOING TO TRY TO
TELL US HOW
THAT WORKS?!

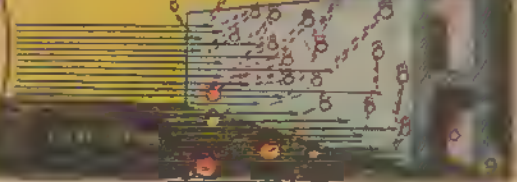


WELL, I'LL
TRY TO GIVE
YOU A SIMPLE
IDEA, ANYWAY!
LET'S GO BACK
TO OUR CATHODE
FOR A MINUTE...
YOU SEE ...

"... just as the cathode
gives off free electrons
when heated...



"... certain metals also
release electrons...when
exposed to light!"



NOW, IN A TELEVISION CAMERA, INSTEAD OF FILM, THERE IS SUCH A LIGHT-SENSITIVE PLATE-- SEALED IN AN ELECTRONIC TUBE...

"WHEN LITTLE BEAMS OF LIGHT HIT THE FRONT OF THIS PLATE, ELECTRONS ON THE LIGHTED SURFACES ARE RELEASED AND LOST..."

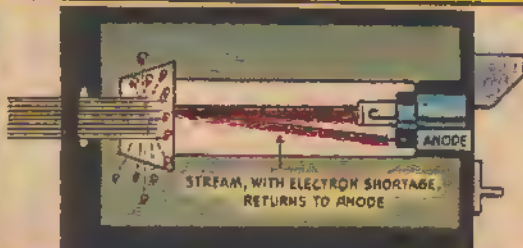
THE MORE LIGHT, THE MORE ELECTRONS LOST!

"BEHIND THIS PLATE IN THE TUBE, THE HEATED CATHODE OF AN ELECTRON-GUN BOILS OFF A STREAM OF ELECTRONS... AND SHOOTS THEM OUT IN A CONCENTRATED BEAM TOWARD THE PLATE..."

ELECTRON-GUN WITH HEATED CATHODE

PLATE

"THE PLATE INSTANTLY ABSORBS FROM THE STREAM ITS EXACT NUMBER OF MISSING ELECTRONS..."



"THE REMAINDER OF THE STREAM, WHICH NOW HAS A SHORTAGE OF ELECTRONS, FLOWS TO THE ANODE... TO COMPLETE THE CIRCUIT."

THAT MEANS THAT THE AMOUNT OF LIGHT ON THE PLATE AFFECTS THE AMOUNT OF THIS SHORTAGE IN THE ELECTRON STREAM...

THAT'S RIGHT... IN OTHER WORDS, WE'VE MEASURED LIGHT WITH ELECTRIC CURRENT!

AND, OF COURSE, EACH LITTLE LIGHT CHANGE ON THE PLATE CAUSES AN EQUAL CHANGE IN THE ELECTRIC CURRENT.

AND HOW DOES THIS PLATE TAKE THE PLACE OF FILM?

WELL, JOHNNY, SUPPOSE FOR A MINUTE THAT WE SAW A PICTURE OF YOUR FACE PRINTED IN A MAGAZINE...

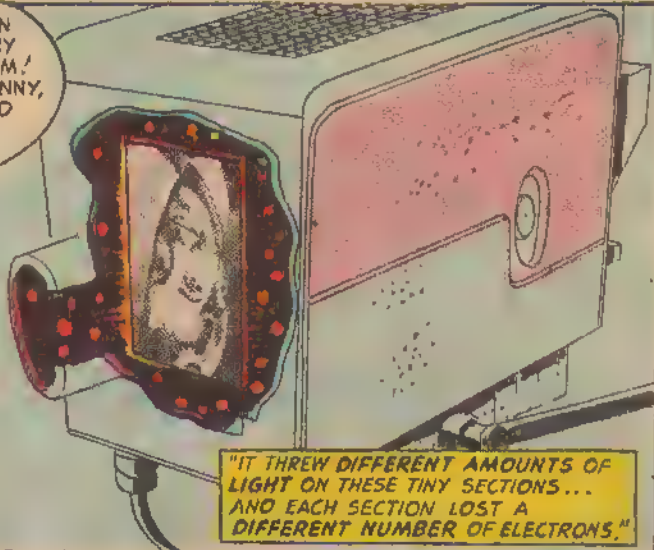
"...A CLOSE LOOK AT IT WOULD SHOW IT TO BE MADE UP OF MANY TINY LIGHT AND DARK AREAS..."

LIGHT

MEDIUM

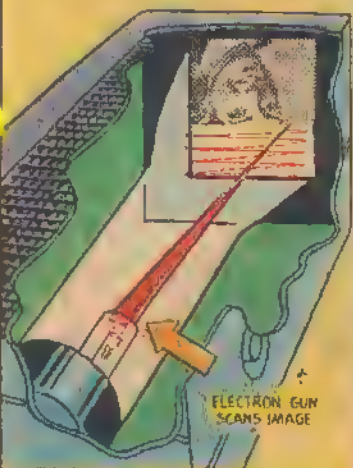
DARK

NOW, THE PLATE IN THE TELEVISION CAMERA IS ALSO MADE UP OF MANY TINY SECTIONS... 360,000 OF THEM! SO THAT IN THE STUDIO TODAY, JOHNNY, WHEN THE CAMERA-LENS FOCUSED YOUR PICTURE-IMAGE ON THAT LIGHT-SENSITIVE PLATE...



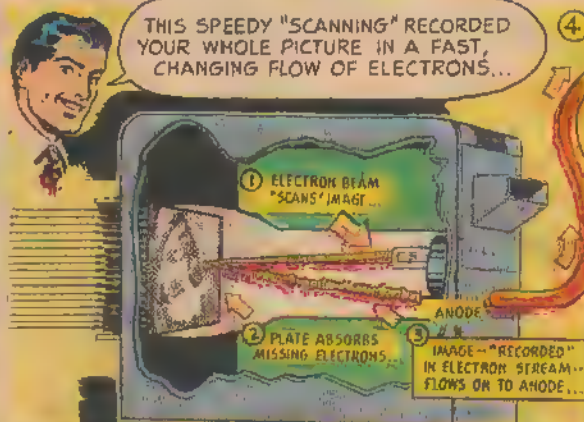
"IT THREW DIFFERENT AMOUNTS OF LIGHT ON THESE TINY SECTIONS... AND EACH SECTION LOST A DIFFERENT NUMBER OF ELECTRONS."

"NOW BEHIND THE PLATE, THE ELECTRON-GUN THEN DIRECTED A STREAM OF ELECTRONS BACK AND FORTH ACROSS YOUR IMAGE..."



"...COVERING ALL OF THOSE 360,000 SECTIONS IN 1/30TH OF A SECOND!"

THIS SPEEDY "SCANNING" RECORDED YOUR WHOLE PICTURE IN A FAST, CHANGING FLOW OF ELECTRONS...



"...WHICH THEN WENT FROM THE CAMERA THROUGH A COAXIAL CABLE TO--"

6 THEN ON TO THE RECEIVING-SET--

7 --WHERE YOU SAW YOURSELF ON THE SCREEN!"



WAIT A MINUTE, ED-- IF JOHNNY'S PICTURE WAS CHANGED INTO A FLOW OF ELECTRONS... AND SINCE YOU CAN'T SEE ELECTRONS, HOW COULD WE SEE HIM ON THE SCREEN?

BECAUSE, JANE--

"...just as the plate in the camera tube loses electrons when hit by light..."



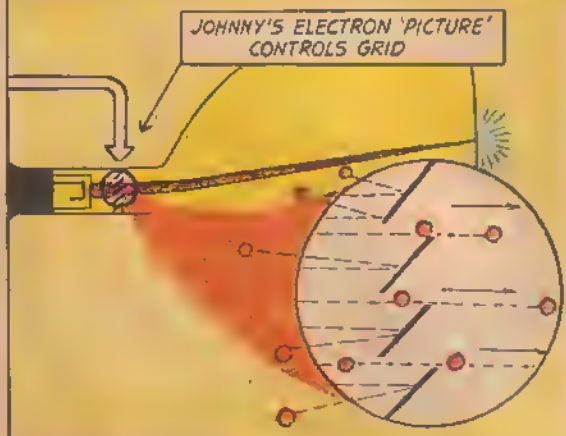
"the screen in the picture tube is chemically-coated to glow with light when hit by electrons!"



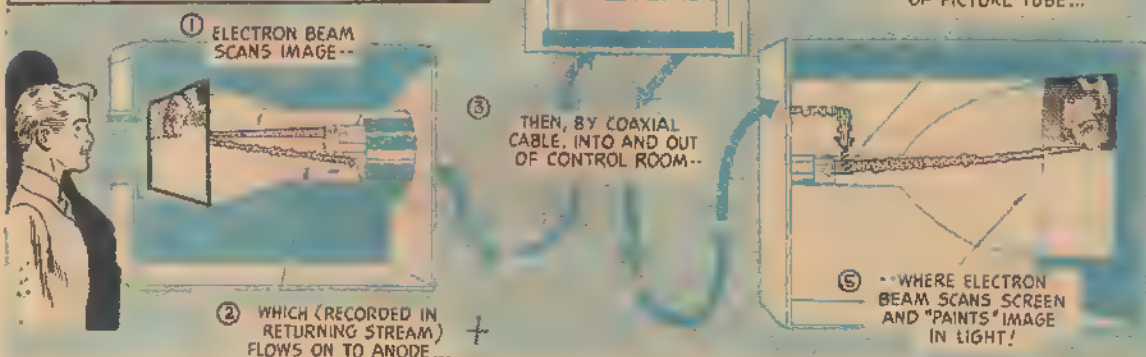
"NOW IN THIS PICTURE-TUBE, AN ELECTRON GUN SHOOTS A STEADY STREAM OF ELECTRONS-- THROUGH A GRID-- TO THE REAR OF THE VIEWING-SCREEN..."



"THE ELECTRIC SIGNALS MAKING UP JOHNNY'S PICTURE WERE FEED INTO THIS GRID, OPERATING IT LIKE A VENETIAN BLIND TO CONTROL THE EXACT NUMBER OF ELECTRONS PASSING THROUGH TO THE SCREEN..."

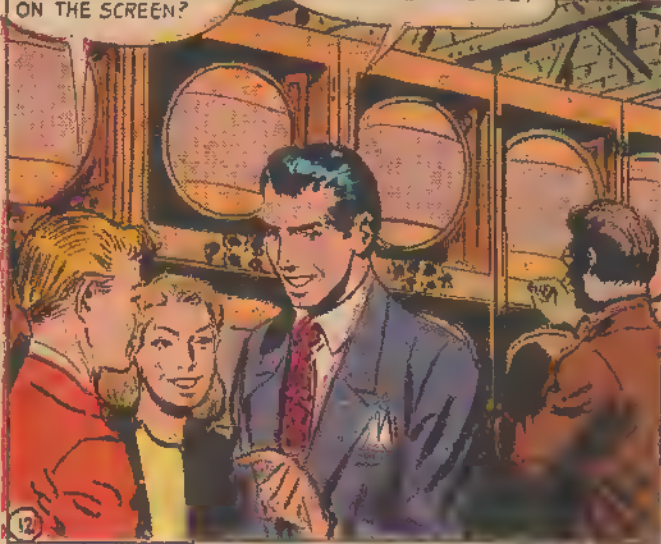


"SO THAT AS THE DIFFERENT AMOUNTS OF ELECTRIC CURRENT HIT THE SCREEN, THEY WERE CHANGED BACK INTO THE EXACT AMOUNTS OF LIGHT WHICH JOHNNY'S IMAGE FIRST THREW ON THE CAMERA-PLATE."



AND YOU SAY IT TOOK ONLY 1/30 OF A SECOND TO RECORD MY WHOLE PICTURE ON THE SCREEN?

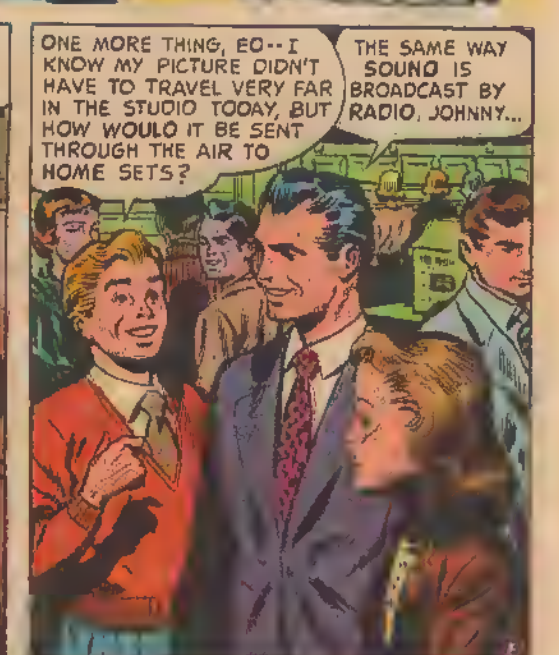
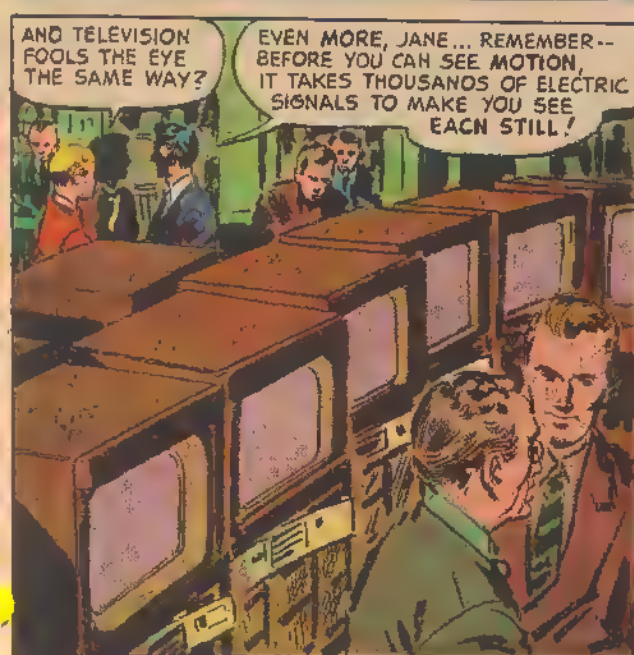
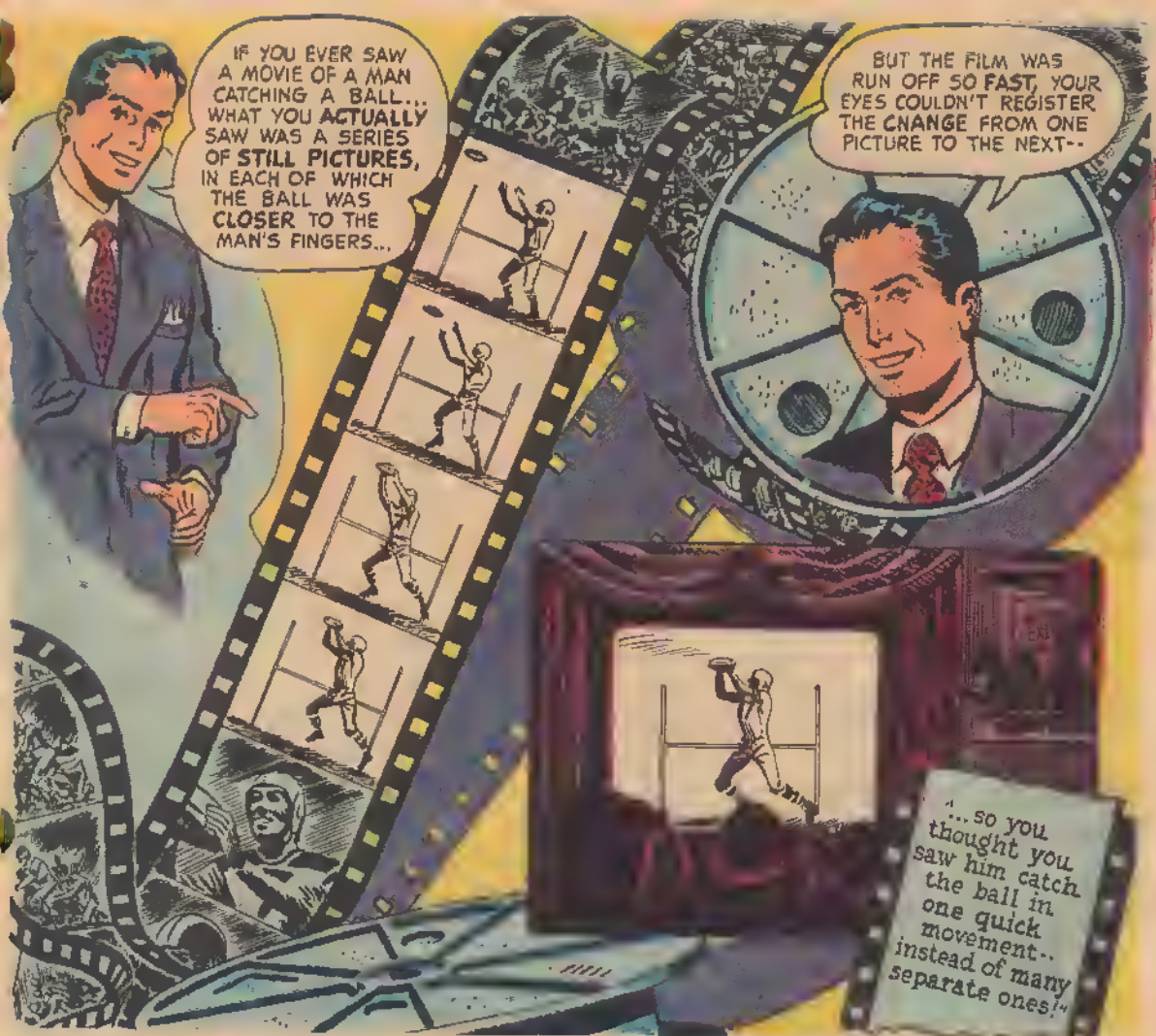
YES, IT'S HARD TO IMAGINE SUCH SPEED, ISN'T IT? SO FAST THAT WE ACTUALLY SAW YOUR WHOLE PICTURE AT ONCE!



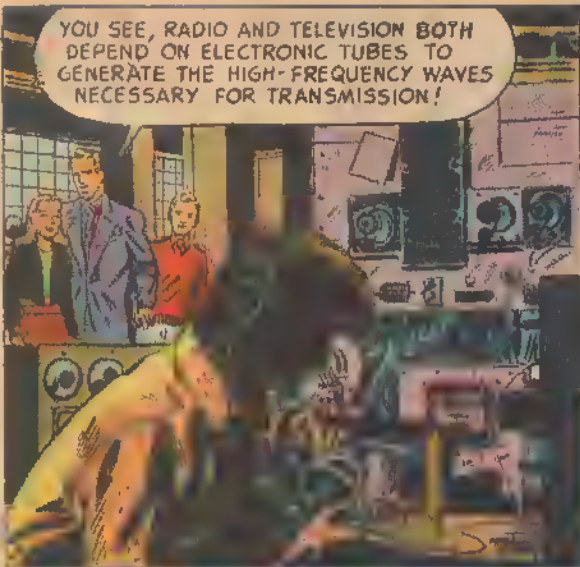
WE EVEN SAW JOHNNY MOVE ON THE SCREEN, ED? HOW DID THAT HAPPEN?

WELL, JANE-- YOU KNOW THAT MOVIES, FOR INSTANCE, ARE SIMPLY A SERIES OF "STILL" PICTURES ON FILM, SHOWN SO FAST THEY SEEM TO MOVE...

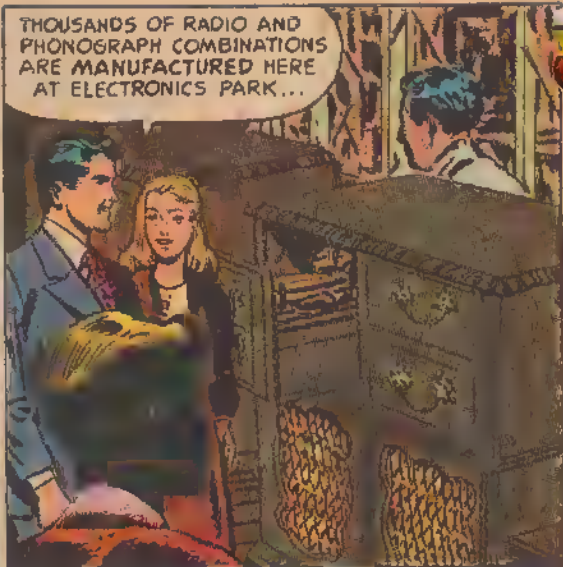




YOU SEE, RADIO AND TELEVISION BOTH DEPEND ON ELECTRONIC TUBES TO GENERATE THE HIGH-FREQUENCY WAVES NECESSARY FOR TRANSMISSION!



THOUSANDS OF RADIO AND PHONOGRAPH COMBINATIONS ARE MANUFACTURED HERE AT ELECTRONICS PARK...

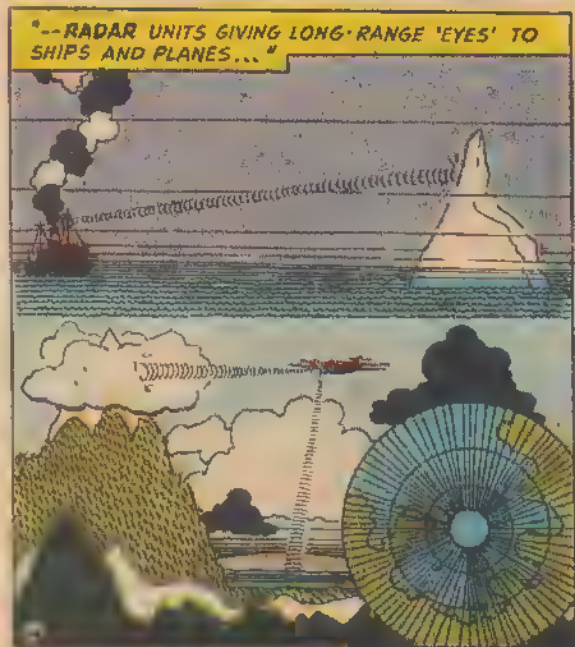


SOON, ON THE PARK'S "CAMPUS"...

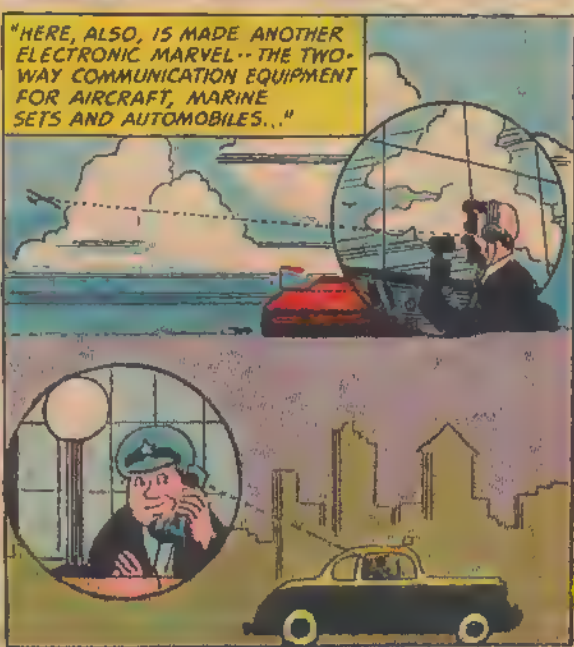


IN THAT BUILDING, THE BIG RADIO AND TELEVISION STATION TRANSMITTERS ARE MADE... ALSO ---

"--RADAR UNITS GIVING LONG-RANGE 'EYES' TO SHIPS AND PLANES..."



"HERE, ALSO, IS MADE ANOTHER ELECTRONIC MARVEL--THE TWO-WAY COMMUNICATION EQUIPMENT FOR AIRCRAFT, MARINE SETS AND AUTOMOBILES..."



...AND THE REMARKABLE
FACSIMILE EQUIPMENT--THAT
BROADCASTS AND PRINTS
NEWSPAPER PICTURES AND
STORIES BY WIRELESS!

WHAT ABOUT THE
ELECTRIC EYE, ED--IS
THAT PART OF
ELECTRONICS, TOO?

THAT'S RIGHT,
JOHNNY...A
LIGHT BEAM IS
INTERRUPTED
AND--

GENERAL

"--DOORS OPEN, AS
IF BY MAGIC!"

"BELLS CLANG, TO
WARN OF DANGER..."

CLANG
CLANG
CLANG
CLANG

"...ELECTRONIC COUNTERS
DO OUR COUNTING
FOR US..."

7,423
7,424
7,425...

CLICK
CLICK

"...DRINKING
FOUNTAINS
SPURT FORTH
WATER!"

AND IN OUR FACTORIES, ELECTRONS
'IN OVERALLS' ARE SILENTLY AND
SWIFTLY AT WORK--

"...INSPECTING FOR
PINHOLES OR
OTHER DEFECTS..."

"...SORTING FOR
COLOR OR SIZE..."

TWO MILLION COLORS?!
AND I THOUGHT THERE
WERE ONLY TEN THOUSAND!

MATCHING CHART
FOR
2,000,000 COLORS

"... FOLLOWING AND
CUTTING COMPLICATED
PATTERNS IN METAL."

"...ANALYZING
FOR CHEMICAL
OR COLOR
MAKE-UP..."

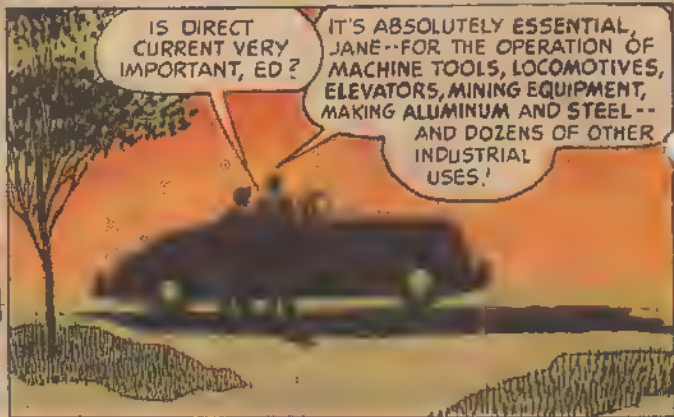
WELL, YOU'RE
ONLY HUMAN.

"AND OF COURSE, ONE OF THE ELECTRONIC
TUBE'S BIGGEST JOBS IS CHANGING
ALTERNATING CURRENT TO DIRECT
CURRENT..."



IS DIRECT
CURRENT VERY
IMPORTANT, ED?

IT'S ABSOLUTELY ESSENTIAL,
JANE--FOR THE OPERATION OF
MACHINE TOOLS, LOCOMOTIVES,
ELEVATORS, MINING EQUIPMENT,
MAKING ALUMINUM AND STEEL--
AND DOZENS OF OTHER
INDUSTRIAL
USES!



GEE--ELECTRONICS
IS REALLY A
WONDERFUL BRANCH
OF ELECTRICAL SCIENCE.

YES...WITH ELECTRONICS,
SCIENCE--INDUSTRY--AND OUR
OWN HOMES--HAVE BEEN GIVEN
NEW "EARS," "EYES" AND "HANDS"
--TO HELP MAKE WORK EASIER...
AND LIFE MORE ENJOYABLE
FOR EVERYONE!

CENTRAL ELECTRIC

SCHENECTADY, N.Y.